REMARKS/ARGUMENTS

Claims 1-7 are pending. Claim 1 is amended. No new matter is added.

Amendments to the Specification

The informalities identified in the specification are corrected herewith. The Specification as originally filed, at page 16, lines 4-7, describes:

> In Example 2, as a transparent conductive film, a zinc oxide film was formed on a glass substrate and evaluation was performed as in Comparative Example 2 ***except that hydrogen was used instead of argon***.

(emphasis added). Therefore, it is clear that the "argon" used in the description of Example 2 should be corrected to "hydrogen." Since the amendments to the Specification are merely formal in nature, they are not believed to raise a question of new matter.

Claim Rejections – 35 U.S.C. § 102

In the outstanding Office Action, Claims 1-5 were rejected under 35 U.S.C. § 102(b) as anticipated by Yamada et al. (5,545,443, hereinafter "Yamada"). In response, Applicant respectfully submits that the rejection is overcome because Claim 1, as amended, distinguishes over Yamada as discussed below.

Claim 1 is amended to recite:

> introducing an organozinc compound and ***a mixed gas in which an oxidizing agent is diluted with a hydrogen gas***, into a deposition chamber to form a transparent conductive film containing zinc oxide as a main component on a substrate disposed in the deposition chamber.

(emphasis added).

Yamada at col. 4, lines 39-50, describes that DEZn and purified water to be used for the reaction are separately supplied from bubblers 8 and 9 as entrained by an Ar carrier gas, and the B_2H_6 gas (prepared in a concentration of 1% and diluted with hydrogen), which is intended for boron doping, is supplied via the same tube 6 which is used for the DEZn. Thus, Yamada describes diluting the B_2H_6 gas with hydrogen; however, Yamada does not teach or suggest diluting the purified water with hydrogen. Since the purified water is not diluted with hydrogen, there can also be no disclosure or suggestion of introducing a mixed gas, in which the purified water is diluted with the hydrogen gas, into a deposition chamber.

Thus, Yamada fails to teach or suggest "introducing an organozinc compound and a mixed gas in which an oxidizing agent is diluted with a hydrogen gas, into a deposition chamber ...," as is required by Claim 1.

The present invention produces unexpected results. As is clear from a comparison between Examples 1 and 2, and Comparative Examples 1 and 2, the transparent conductive film of the present invention shows a higher transmittance (and in-plane uniformity) and lower resistivity, when hydrogen is used as the dilution gas. Furthermore, a comparison between Example 3 and Comparative Example 3 demonstrates that hydrogen dilution achieves higher photoelectric conversion properties.

The reason why the higher transmittance was achieved is discussed at the paragraph bridging pages 7 and 8, and at page 10, lines 5-13 of Applicant's specification, and a putative mechanism of lower resistivity is discussed at page 17, lines 2-6 of Applicant's specification.

Additional Differences between Yamada and amended Claim 1.

As discussed above, Yamada describes diluting the B_2H_6 gas with hydrogen. Furthermore, in Yamada, H_2O (oxidizing agent) and DEZ (organozinc compound)

are diluted with argon gas. Therefore, hydrogen gas is used for diffusing B_2H_6 gas in Yamada, while hydrogen gas performs the role of diffusing the oxidizing agent (e.g., H_2O in the Examples) in the present invention.

When oxidizing agent and hydrogen gas are mixed in advance of reaction with organozinc compound (namely, before an introduction to a deposition chamber), the reaction efficiency of the organozinc compound with the oxidizing agent and the decomposition efficiency of organozinc compound are enhanced. This is because hydrogen gas shows higher thermal conductivity than argon and thereby the oxidizing agent is preheated more efficiently.

Due to the enhanced efficiency of the reaction and decomposition of organozinc compound, the deposition efficiency (i.e., deposition rate) as well as the uniformity of the transparent conductive film is improved.

In contrast, argon is used for a dilution gas of the oxidizing agent in Yamada. As shown in Fig. 1 of Yamada, B_2H_6 diluted with hydrogen is mixed with DEZn (organozinc compound) in advance of its introduction into a deposition chamber, but H_2O oxidizing agent) is not diluted (or mixed) with hydrogen in advance.

In order to emphasize and substantiate the points discussed above, Applicant submits concurrently herewith a Declaration pursuant to 37 CFR 1.132 from inventor Susumu Fukuda.

Accordingly, independent Claim 1 patentably distinguishes over Yamada. Since Claims 2-5 depend from Claim 1, substantially the same arguments set forth above also apply to these dependent claims. Therefore, withdrawal of the rejection is respectfully requested.

Claim Rejections – 35 U.S.C. § 103

In the outstanding Office Action, Claims 1-7 were rejected under 35 U.S.C. § 103(a) as unpatentable over WO03/021690 (translation provided by Kroll et al. (7,390,731), hereinafter "Kroll") or Vijayakumar et al. (4,851,149, hereinafter "Vijayakumar") in combination with Yamada.

The Office Action acknowledges that Kroll fails to teach the use of a diluting gas such as hydrogen (Office Action at page 4, lines 4-5). The Office Action also acknowledges that Vijayakumar fails to teach hydrogen as the inert gas (Office Action at page 4, line 12). Instead, the Office Action relies on Yamada to remedy the deficiencies, stating that Yamada teaches using hydrogen gas as a diluting gas in the formation of zinc oxide film doped with boron and aluminum (Office Action at page 4, lines 13-14).

However, as discussed above, Yamada fails to teach or suggest introducing a mixed gas of the purified water and the hydrogen gas into a deposition chamber. Therefore, even the combination of Kroll or Vijayakumar with Yamada can not teach or suggest "introducing an organozinc compound and a mixed gas in which an oxidizing agent is diluted with a hydrogen gas, into a deposition chamber ...," as is required by Claim 1.

Accordingly, independent Claim 1 patentably distinguishes over the applied references. Since Claims 2-7 depend from Claim 1, substantially the same arguments set forth above also apply to these dependent claims. Therefore, withdrawal of the rejection is respectfully requested.

Conclusion

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (310)785-4600 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
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